IN THE CLAIMS

Please add the following new claims:

--90. A time-of-flight mass spectrometer (TOFMS), wherein said TOFMS comprises:

a source region including a sample holder and at least one electrode disposed therein;

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means for generating ions from said sample holder;

an ion reflector, said reflector being energized;

means for accelerating said ions orthogonally from said source region into a drift region of said TOFMS toward said ion reflector; and

an ion detector remote from said ion reflector for detecting said accelerated ions such that mass to charge ratios of said accelerated ions may be determined;

wherein a first potential is applied to said sample holder to accelerate said ions toward said means for accelerating;

wherein said reflector reflects said ions toward said detector; and

wherein the time spread in the time of flight of ions of a predetermined mass to charge ratio generated within said source region to the means for detecting is minimized.

91. A TOFMS according to claim 90, wherein said means for accelerating comprises a pair of electrodes.

92. A TOFMS according to claim 91, wherein said pair of electrodes comprises at least one plate and at least one grid.

93. A TOFMS according to claim 91, wherein at least one potential is applied to at least one of said electrodes such that an electric field is generated within said means for accelerating.

94. A TOFMS according to claim 91, wherein said ions generated in said source region have an initial velocity component parallel to a surface of said electrodes of said means for accelerating.

95. A TOFMS according to claim 91, wherein said ions generated from said sample source have a first initial velocity component perpendicular to said sample holder and a second initial velocity component parallel to said electrodes of said means for accelerating.

96. A TOFMS according to claim 90, wherein said ions have an initial velocity component perpendicular to said sample holder.

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97. A TOFMS according to claim 90, wherein said ions are desorbed from a surface of said sample holder.

98. A TOFMS according to claim 90, wherein a voltage pulse is applied to said detector to increase the gain of said detector.

99. A TOFMS according to claim 90, wherein said ions are continuously generated in said source region.

100. A TOFMS according to claim 90, wherein said ions have a non-isotropic initial velocity distribution.

101. A TOFMS according to claim 90, wherein said ions have an average initial velocity distribution not equal to zero.

102. A TOFMS according to claim 90, wherein said ions have an average initial velocity component greater than zero.

103. A TOFMS according to claim 90, wherein said TOFMS further comprises a deflector to deflect unwanted ions from the ion path.

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104. A TOFMS according to claim 90, wherein said means for generating said ions is selected from the group consisting of fast atom bombardment, matrix assisted laser desorption, plasma desorption, secondary ion generation, and electron bombardment.

105. A TOFMS according to claim 90 wherein said ions are generated from a sample selected from the group consisting of a protein and DNA.

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106. A method of improving mass resolution in time-of-flight mass spectrometry, said method comprising the steps of:

establishing a first electric field in a source region that includes a sample holder;

ionizing a sample proximately disposed to said sample holder to form sample ions;

establishing a second electric field in an accelerating region;

energizing an ion reflector spaced apart from the first element; and

detecting said sample ions at an ion detector such that mass to charge ratios of said sample ions may be determined;

wherein said first electric field accelerates said sample ions from said sample holder toward said accelerating region;

wherein said second electric field accelerates said sample ions from said sample holder toward said reflector; and

wherein the time spread in the time of flight of said sample ions of a predetermined mass to charge ratio generated within said source region to said ion detector is minimized.

107. A method according to claim 106, wherein said accelerating region is defined by a pair of parallel conducting electrodes.

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108. A method according to claim 107, wherein said pair of electrodes comprises at least one plate and at least one grid.

109. A method according to claim 107, wherein at least one potential is applied to at least one of said electrodes to create said second electric field.

110. A method according to claim 107, wherein said ions generated in said source region have an initial velocity component parallel to a surface of said electrodes.

111. A method according to claim 107, wherein said ions generated in said source region have a first initial velocity component perpendicular to said sample holder and a second initial velocity component parallel to a surface of said electrodes.

112. A method according to claim 106, wherein said ions have an initial velocity component perpendicular to said sample holder.

113. A method according to claim 106, wherein said ions are desorbed from a surface of said sample holder.

114. A method according to claim 106, wherein a voltage pulse is applied to said detector to increase the gain of said detector.

115. A method according to claim 106, wherein said ions are continuously generated in said source region.

116. A method according to claim 106, wherein said ions have a non-isotropic initial velocity distribution.

117. A method according to claim 106, wherein said ions have an average initial velocity distribution not equal to zero.

118. A method according to claim 106, wherein said method further comprises the step of:

deflecting unwanted ions from the ion path.

119. A method according to claim 106, wherein said ions are generated from a sample selected from the group consisting of a protein and DNA.

120. A method of operating a time-of-flight mass spectrometer (TOFMS) having a first region including a sample source disposed therein, and flight tube region including an ion detector, said method comprising the steps of:

generating ions from a sample source within the first region;

establishing an ion accelerating field within the flight tube region, said ion accelerating field accelerating said ions generated within the first region toward the ion detector; and

detecting said accelerated ions at the ion detector and determining the mass to charge ratios of said accelerated ions.

121. A method according to claim 120, wherein said method further comprises the step of:

energizing an ion reflector remote from said first region such that said ions accelerated by said accelerating field are reflected toward said ion detector.

122. A method according to claim 120, wherein said ion accelerating field is established across a pair of parallel conducting electrodes.

123. A method according to claim 122, wherein said pair of electrodes comprises at least one plate and at least one grid.

124. A method according to claim 122, wherein at least one potential is applied to at least one of said electrodes to create said accelerating field.

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125. A method according to claim 122, wherein said ions generated from said sample source have an initial velocity component parallel to a surface of said electrodes.

126. A method according to claim 122, wherein said ions generated from said sample source have a first initial velocity component perpendicular to a surface of said sample source and a second initial velocity component parallel to a surface of said electrodes.

127. A method according to claim 120, wherein said ions have an initial velocity component perpendicular to a surface of said sample source.

128. A method according to claim 120, wherein said ions are desorbed from a surface of said sample source.

129. A method according to claim 120, wherein a voltage pulse is applied to said detector to increase the gain of said detector.

130. A method according to claim 120, wherein said ions are continuously generated in said first region.

131. A method according to claim 120, wherein said ions have a non-isotropic initial velocity distribution.

132. A method according to claim 120, wherein said ions have an average initial velocity distribution not equal to zero.

133. A method according to claim 120, wherein said method further comprises the step of:

deflecting unwanted ions from the ion path.

134. A method according to claim 120, wherein said ions are generated from a sample selected from the group consisting of a protein and DNA.

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135. A method of operating a time-of-flight mass spectrometer, the spectrometer having a source region including a sample source disposed therein, an analyzer region including an ion accelerating means and an ion detector positioned remote from the source region, said method comprising the steps of:

establishing a non-zero field within the source region;

generating ions from the sample source within the source region;

establishing an ion accelerating field within the analyzer region after establishing said non-zero field in the source region, said ion accelerating field orthogonally accelerating said ions generated within said source region in a path leading to the ion detector; and

detecting said accelerated ions at the ion detector and determining therefrom mass to charge ratios of said accelerated ions.

136. A method according to claim 135, wherein said method further comprises the step of:

energizing an ion reflector remote from said source region such that said ions accelerated by said accelerating field are reflected toward said ion detector.

137. A method according to claim 135, wherein said ion accelerating field is established across a pair of parallel conducting electrodes.

138. A method according to claim 137, wherein said pair of electrodes comprises at least one plate and at least one grid.

139. A method according to claim 137, wherein at least one potential is applied to at least one of said electrodes to create said accelerating field.

140. A method according to claim 137, wherein said ions generated from said sample source have an initial velocity component parallel to a surface of said electrodes.

141. A method according to claim 137, wherein said ions generated from said sample source have a first initial velocity component perpendicular to a surface of said sample source and a second initial velocity component parallel to a surface of said electrodes.

142. A method according to claim 135, wherein said ions have an initial velocity component perpendicular to a surface of said sample source.

143. A method according to claim 135, wherein said ions are desorbed from a surface of said sample source.

144. A method according to claim 135, wherein a voltage pulse is applied to said detector to increase the gain of said detector.

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145. A method according to claim 135, wherein said ions are continuously generated in said source region.

146. A method according to claim 135, wherein said ions have a non-isotropic initial velocity distribution.

147. A method according to claim 135, wherein said ions have an average initial velocity distribution not equal to zero.

148. A method according to claim 135, wherein said method further comprises the step of:

deflecting unwanted ions from the ion path.

149. A method according to claim 135, wherein said ions are generated from a sample selected from the group consisting of a protein and DNA.--

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